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Glozier, N.S, Hackett, Maree orcid iconORCID: 0000-0003-1211-9087, Parag, Varsha and Anderson, Craig (2008) The influence of psychiatric morbidity on return to paid work after stroke in younger adults: The auckland regional community stroke (ARCOS) study, 2002 to 2003. Stroke, 39 (5). pp. 1526-1532. ISSN 0039-2499

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Stroke. 2008;39:1526-1532; originally published online March 27, 2008;
doi: 10.1161/STROKEAHA.107.503219
Stroke is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231

Print ISSN: 0039-2499. Online ISSN: 1524-4628

The Influence of Psychiatric Morbidity on Return to Paid Work After Stroke in Younger Adults

The Auckland Regional Community Stroke (ARCOS) Study, 2002 to 2003

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Background and Purpose—Few data exist on the determinants of return to paid work after stroke, yet participation in employment is vital to a person's mental well-being and role in society. This study aimed to determine the frequency and determinants of return to work, in particular the effect of early psychiatric morbidity, in a population-based study of stroke survivors.

Methods—The third Auckland Regional Community Stroke (ARCOS) study was a prospective, population-based, stroke incidence study undertaken in Auckland, New Zealand during 2002 to 2003. After a baseline assessment early after stroke, data were collected on all survivors at 1 and 6 months follow-up. Multiple variable logistic regression was used to determine predictors of return to paid work. Data are reported with odds ratios (OR) and 95% confidence intervals (CI).

Results—Among 1423 patients registered with first-ever strokes, there were 210 previously in paid employment who survived to 6 months, of whom 155 (74%) completed the GHQ-28 and 112 (53%) had returned to paid work. Among those cognitively competent, psychiatric morbidity at 28 days was a strong independent predictor of not returning to work (Odds Ratio 0.39; 95% CI 0.22 to 0.80). Non–New Zealand European ethnicity (OR 0.40; 95% CI 0.17 to 0.91), prior part-time, as opposed to full-time, employment 0.36 (0.15 to 0.89), and not being functionally independent soon after the stroke 0.28 (0.13 to 0.59) were the other independent age- and gender-adjusted predictors of not successfully returning to paid work.

Conclusions—About half of previously employed people return to paid employment after stroke, with psychiatric morbidity and physical disability being independent, yet potentially treatable, determinants of this outcome. Appropriate management of both emotional and physical sequelae would appear necessary for optimizing recovery and return to work in younger adults after stroke. **(*Stroke*. 2008;39:1526-1532.)**

Key Words: stroke ■ work ■ employment ■ psychiatric morbidity ■ outcome ■ New Zealand

Stroke is recognized as a leading cause of global disease burden.[1] However, although considered a disease related to ageing and measured in terms of "hard outcomes" such as events, case fatality, and dependency, the broader personal, economic, and social impact of the illness are often overlooked in the research: For instance there is minimal evidence identified in clinical guidelines of the effectiveness for any return to work intervention.[2] In high income countries, some 20% of strokes occur in people of working age, many of whom are in paid employment; the figure is probably much higher in low- to middle-income countries where the average age of onset of stroke is lower.[3] Because younger adults have responsibilities for generating an income and supporting family members, return to work is a key goal in recovery from disabling illness such as stroke.[4]

The economic cost of stroke is enormous. In Australia, for example, the lifetime cost of stroke was estimated at US$985 million in 2003, with lost productivity accounting for approximately 10% of these costs in the first year and nonhealth related costs escalating in subsequent years after stroke.[5] Given improved survival after stroke,[6,7] and an aging population and workforce, the costs of stroke are expected to further increase, with lost productivity projected to be a major component.[8]

There is limited research on return to work after stroke, and most of the studies have been undertaken on patients dis-

Received August 27, 2007; final revision received September 19, 2007; accepted October 10, 2007.

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Stroke **is available at http://stroke.ahajournals.org** **DOI: 10.1161/STROKEAHA.107.503219**

charged from rehabilitation centers.[9–11] These are complicated by case mix and referral bias, and have produced wide ranging estimates (11% to 85%) of the proportion of patients returning to work after stroke.[12] Small sample sizes, inconsistent definitions of 'work', limited range of variables assessed, and varying lengths of follow up, also hamper the generalizability of these data. Stroke severity, as assessed by the degree of residual disability, is the most consistent predictor of return to work,[12] but there is uncertainty over the significance of other factors such as age, sex, location of stroke lesion, cognitive deficits, and medical comorbidities.[12] While socio-economic status and level of education[13] appear important in determining the ability to work after myocardial infarction, these factors have rarely been considered in the setting of stroke.[12] Job contextual factors may also be important, for example a 'less demanding' job may make it easier to return to work after stroke.[14]

Employment is a key determinant of one's role in society, and psychiatric morbidity is a major cause for poor work performance and absence from the workforce.[15,16] Psychiatric morbidity is also an under-recognized cause of receiving a disability pension even when there are seemingly limited physical reasons.[17] Such morbidity is common after stroke[18] with 2 studies, limited by cross sectional nature or low follow-up rates showing variable association with reduced employment,[19] unlike the consistency shown after acute coronary syndromes.[20] We aimed to determine the frequency and determinants of return to work, in particular the effect of early psychiatric morbidity, in a population-based stroke incidence study.

Methods

Overview

The third Auckland Regional Community Stroke (ARCOS) study, an ideal population based stroke incidence design, and its recruitment strategy have been described elsewhere.[21] In brief, multiple overlapping sources including all hospitals, local community services, general practitioners, residential care facilities, and national mortality and hospital morbidity data were checked prospectively using an active, prospective, "hot pursuit" surveillance system to ascertain all new stroke events (including cases of suspected stroke and transient ischemic attack) among adults (≥15 years) who were normally resident of Auckland, New Zealand (NZ) during a 12-month period in 2002 to 2003. Research nurses were based in the public hospitals and conducted daily screens of all admissions, whereas all other sources were screened at least monthly. This surveillance continued for 6 months after the end date for stroke onset. Strokes were defined according to the standard World Health Organization clinical definition, and categorized as first-ever or recurrent, and by major pathological subtypes defined on the basis of the clinical syndrome and results of neuroimaging and other investigations. For the present study only "cognitively competent" patients (those scoring greater than 6 on the Hodkinson Mental Test[22]) were included as those scoring lower did not provide any self report data, including the GHQ28. There were no other exclusion criteria. The Auckland Ethics Committee approved the study and written informed consent was obtained from patients, or a next of kin where cases were deceased or severely disabled.

Measures

Trained and supervised study nurses undertook face-to-face interviews with patients or suitable proxy where appropriate, as soon as possible after notification for baseline data. Questionnaires were used to obtain information including sociodemographics, clinical features, management, self reported cardiovascular disease, and smoking status ("present." "former" ≥1 year, and "never" smoked). A psychiatric history was based on use of psychotropic medication in the last month or any previous treatment for depression. Higher levels of premorbid functioning were assessed using the Frenchay Activities Index (FAI), which covers 15 domains of activities within and outside the home, to produce total scores ranging from 15 ("low") to 45 ("high").[23] The disability associated with stroke severity was assessed according to dependence on others for basic self care activities as assessed by scores on the Barthel Index (BI)[24] in the following week. In the multivariate analyses this was dichotomized into independent versus dependent, with those scoring less than the maximum 20 being considered dependent. Ethnicity was self-identified as NZ/European, Maori, Pacific Islander, Asian, or other, according to definitions used in the most recent national census. Patients who were not known to have died were followed up by telephone interview at 1 and 6 months after the index event. Data were also collected on health service utilization including hospitalization and use of rehabilitation and community services.

Participant's psychiatric morbidity (not from proxies) was assessed at 1 month using the 28-item General Health Questionnaire (GHQ-28).[25] This is the most widely used screening measure of a wide range of psychological symptoms with numerous studies supporting its validity and reliability in a range of settings including stroke.[18,25] A single "general factor" explains the majority of the variance in all these symptoms and the instrument is commonly used with scores above the 4/5 cut point defining "psychiatric morbidity." It specifically does not describe any particular diagnosis although this psychiatric morbidity is commonly referred to as "depression" in the stroke literature.[18]

Employment status was determined using the questions "During the month before your stroke were you in full-time or part-time paid work?" at baseline, and "In the last 6 months before your stroke how often did you undertake gainful (paid) work?" during follow-up, cross referenced with the type of work recorded.

Statistical Analyses

All analyses were restricted to those patients with first-ever stroke who were in paid employment at the time of the stroke, were cognitively competent, and not requiring proxy information. To explore potential selection bias and generalizability baseline exposure variables were compared between those completing and not completing the GHQ-28 at 1 month using χ^2 test for categorical variables (or Fisher's exact test where appropriate), and the Student t test and Mann–Whitney U test for continuous variables. Similar procedures were undertaken to examine associations of baseline factors and psychiatric morbidity at 1 month with return to work, and to determine potential confounders. Baseline variables for which there is a priori evidence that they might predict return to paid work after stroke or variables that demonstrated a significant association ($P<0.20$) with the outcome in bivariate analyses were considered for possible inclusion in multivariable models. This was conducted in SAS 9.1 using complete participant analysis. Age and gender were forced into the models that were entered blockwise. In the instance of high correlation between variables (defined as >0.3), only 1, the degree of independence, was entered into the model as the other 2 variables, length of stay and transfer to rehabilitation, were considered to be on the causal pathway to our outcome. Data were reported with odds ratios (OR) and 95% confidence intervals (CI).

Results

A total of 1423 patients with first-ever stroke were registered in the study, and 279 (20%) of them reported being in paid employment before the index event. Table 1 describes the characteristics and the Figure outlines the flow of patients during follow-up. Of those previously employed patients, 55 died before 28 days, 24 were not cognitively competent at the 28 day interview, and 36 were either unavailable or refused

Table 1. Baseline Characteristics, and by 28-Item General Health Questionnaire (GHQ-28) Status of Patients Who Were in Paid Employment Before Their First-Ever Stroke

			Alive at 28 Days(n=224)				
	Baseline (n=279)		GHQ-28 Completed (n=164)		GHQ-28 not Completed (n=60)		
	n	%	n	%	n	%	*P* Value*
Demographics							
Female	90	32	49	30	23	38	ns
Age, mean (±SD), years	55	(±11)	55	(±11)	55	(±11)	ns
Ethnicity							
NZ/European	183	66	111	68	35	58	ns
Maori	32	12	20	12	7	12	
Pacific	33	12	17	10	9	15	
Asian	26	9	13	8	9	15	
Other	4	1	3	2	0		
Education to high school only	101	44	91	55	25	42	ns
Married/partnered	210	75	126	77	47	78	ns
Full time employment	210	76	123	75	41	68	ns
Main income earner	180	74	122	74	34	57	ns
Medical history							
Current smoker	71	24	35	21	11	18	ns
High blood pressure	130	49	79	48	29	48	ns
Heart disease	54	20	27	16	11	18	ns
Diabetes	37	13	21	13	10	17	ns
Psychiatric history							
Medication in last month	8	3	5	3	0		ns
Treatment for depression	21	10	17	10	4	7	ns
Pathological stroke type							
Infarction	197	71	121	74	43	72	0.02
Intracerebral hemorrhage	30	11	22	13	3	5	
Subarachnoid hemorrhage	46	16	17	10	14	23	
Undetermined	6	2	4	2	0		
Stroke related speech problems	174	64	97	60	40	68	ns
Degree of physical disability							
Barthel index†, mean (±SD)	14	(±8)	17	(±5)	13	(±8)	<0.0001
Dependent	60	23	13	8	18	30	<0.0001
Moderate dependence	73	27	51	31	18	30	
Independent	133	50	98	60	23	38	
Frenchay activities index‡, mean (±SD)	33	(±7)	33	(±7)	33	(±9)	ns
Hospital management							
Duration, mean (±SD), days	10	(±10)	9	(±9)	12	(±10)	<0.05
Inpatient rehabilitation	82	30	45	27	28	47	0.01
Duration, mean (±SD), days	47	(±30)	45	(±30)	55	(±30)	ns
In own home at 28 days	171	61	133	81	38	63	0.006

ns indicates not significant; NZ, New Zealand; SD, standard deviation.

*Comparison of baseline characteristics of those alive at 28 days by GHQ-28 completion; NS indicates non-significant.

†Physical disability graded on the Barthel Index, 0–20, where 0–10 indicates "fully dependent," 10–19 indicates "moderate disability," and 20 indicates "independent in basic self care activities of daily living."

‡Frenchay activities index assesses higher level activities within and outside the home, with scores across 15 domains totalling a range of 15 ("low") to 44 ("high").

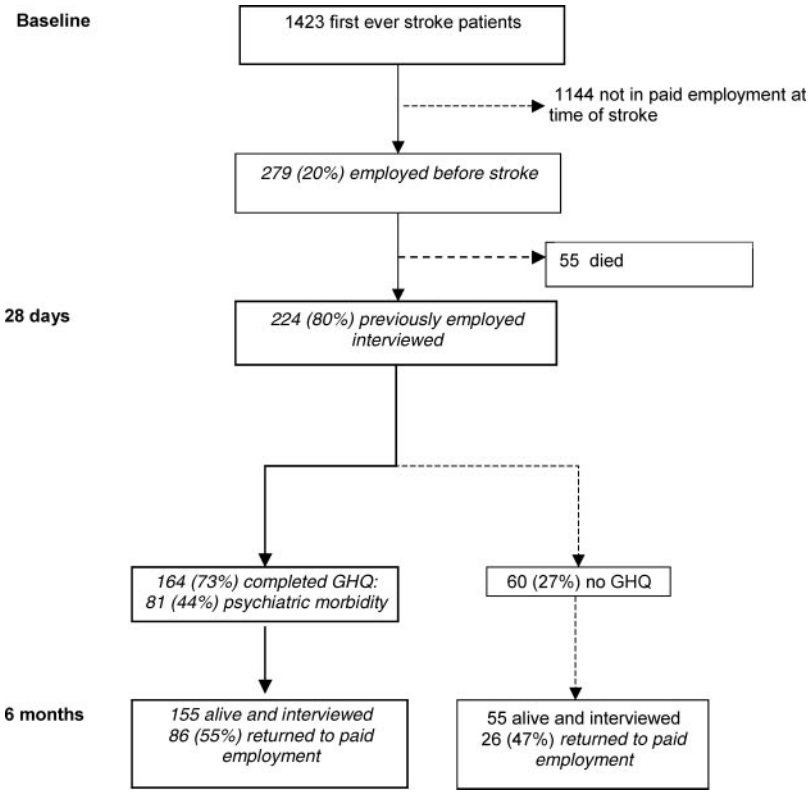

Figure. Flow of participants through the study.

an interview, leaving 164 who had a GHQ-28 assessment at 1 month. There were 210 (94%) previously employed patients at 28 days who survived to 6 months, and 112 (53%) of them had returned to full-time work.

As shown in Table 1 of patients with and without a GHQ-28, the former group had less severe strokes as reflected by higher BI scores in the acute phase and were less likely to have been managed in hospital. Moreover, patients with a GHQ-28 had shorter lengths of stays in hospital, were less likely to have had in-hospital rehabilitation, and more likely to have been discharged directly home. There were differing proportions of major stroke types but similar sociodemographic and risk factor profiles between the groups. However, a similar proportion (26/55 [47%]) of those without recorded GHQ scores at 1 month and able to be followed had returned to work by 6 months as in those with recorded GHQ scores. Among those with recorded GHQ scores, psychiatric morbidity at 28 days was associated with being younger, a greater stroke severity (assessed by lower BI scores, longer length of hospital stay and greater likelihood of transfer to rehabilitation) and previous treatment for depression (data not shown).

Being in full-time employment before stroke, NZ/European ethnicity, not having prior diabetes or psychiatric morbidity at 28 days, and experiencing a less severe stroke (high BI score, shorter hospital stay, and being less likely to have received inpatient rehabilitation) were each independently associated with a higher likelihood of return to paid work at 6 months in univariate analyses, shown in Table 2. As BI scores were highly correlated with receiving inpatient rehabilitation, only BI score was entered into the multivariate model and dichotomised as "independent" or "other."

Of those working at 6 months with a 28-day GHQ recorded, only 37/86 (43%) had psychiatric morbidity at 28 days compared to 44/69 (64%) of those not working by this stage. As shown in Table 3, the likelihood of working was reduced in the presence of early psychiatric morbidity (OR 0.42; 95% CI 0.22 to 0.80). In the multivariable models (Table 3), this association was not confounded by demographic or other factors which were identified in univariate analyses as being associated with returning to work. In the full model, non-NZ/European ethnicity (OR 0.40; 95% CI 0.17 to 0.91), prior part-time employment (OR 0.36; 95% CI 0.15 to 0.89), and not being independent in activities of daily living as measured by BI score (OR 0.28; 95% CI 0.13 to 0.59) were the only other independent predictors of a successful return to work, with a *C statistic* (a measure of the ability of a model to discriminate between outcomes where 1 is perfect and 0.5 chance) for this model of 0.76.[26] Only a minority 30% (25/81) of those with psychiatric morbidity at one month reported having any treatment for this by 6 months.

Discussion

In these analyses, a broad range of potential determinants of return to paid work were examined in a large sample of patients registered in a population-based stroke incidence study. We have shown that about a half of all previously employed people were able to return to work within several months of acute stroke. The factors of nonwhite ethnicity, only part-time employment before stroke, stroke severity, and as hypothesized, psychiatric morbidity at 28 days poststroke were independently associated with a significantly lower likelihood of returning to work.

Table 2. Characteristics of Patients by Return to Paid Work Status at 6 Months

	Working at 6 Months (n=210)				
	Yes (n=112)		No (n=98)		
	n	%	n	%	*P* Value
Demographics					
Female	32	29	34	35	ns
Age, mean (±SD), years	55	(±11)	56	(±12)	ns
Ethnicity					
NZ/European	84	75	56	57	0.05
Maori	8	7	15	15	
Pacific	11	10	12	12	
Asian	7	6	14	14	
Other	2	2	1	1	
Education to high school only	64	57	48	49	ns
Married/partnered	88	79	75	77	ns
Full time employment at baseline	92	82	66	67	0.01
Main income earner	83	74	65	66	ns
Medical history					
Current smoker	20	18	25	26	ns
High blood pressure	54	48	48	49	ns
Heart disease	13	12	21	21	ns
Diabetes	10	9	18	18	<0.05
Psychiatric history					
Medication in last month	4	4	1	1	ns
Treatment for depression	9	8	12	12	ns
Psychiatric morbidity at 28 days (n=155)	37	43	44	64	0.008
Pathological stroke type					
Infarction	79	71	75	77	ns
Intracerebral hemorrhage	12	11	12	12	
Subarachnoid hemorrhage	18	16	10	10	
Undetermined	3	3	1	1	
Stroke related speech problems	63	56	65	67	ns
Degree of physical disability					
Barthel index*, mean (±SD)	18	(±3)	13	(±7)	<0.001
Dependent	2	2	27	28	<0.001
Moderate dependence	28	25	39	40	
Independent	80	71	31	32	
Frenchay activities index†, mean (±SD)	34	(±7)	32	(±8)	ns
Hospital management					
Duration, mean (±SD), days	7	(±6)	13	(±12)	<0.001
Inpatient rehabilitation	18	16	53	54	<0.001
Duration, mean (±SD), days	24	(±17)	56	(±30)	<0.001
In own home at 28 days	105	94	55	56	0.006

ns indicates not significant; NZ, New Zealand; SD, standard deviation.

*Physical disability graded on the Barthel Index, 0–20, where 0–10 indicates "fully dependent," 10–19 indicates "moderate disability," and 20 indicates "independent in basic self care activities of daily living."

†Frenchay activities index assesses higher level activities within and outside the home, with scores across 15 domains totaling a range of 15 ("low") to 44 ("high").

P value from test comparing the 2 groups as in analysis.

Table 3. Multivariable Models of Predictors of Return to Work at Six Months Poststroke

	Completed GHQ-28 (n=155)		
	Model 1 Odds Ratio (95% CI)	Model 2 Odds Ratio (95% CI)	Model 3 Odds Ratio (95% CI)
Psychiatric morbidity	0.42 (0.22 to 0.80)	0.35 (0.17 to 0.70)	0.39 (0.18 to 0.81)
Age		0.97 (0.94 to 1.01)	0.98 (0.95 to 1.02)
Female		0.62 (0.29 to 1.34)	0.73 (0.33 to 1.64)
Part-time employment before stroke		0.47 (0.20 to 1.08)	0.36 (0.15 to 0.89)
Non NZ/European Ethnicity		0.29 (0.14 to 0.64)	0.40 (0.17 to 0.91)
Not independent on the Barthel Index[a]			0.28 (0.13 to 0.59)
Diabetes			0.47 (0.15 to 1.42)

86/155 had returned to work by 6 months.
Model 1: Psychiatric morbidity only (C statistic 0.61).
Model 2: Psychiatric morbidity+sociodemographic data (c statistic 0.71).
Model 3: All univariate predictors+age and gender of returning to work (c statistic 0.76).
a: "Independence" defined as the maximum score of 20 on the Barthel scale.
CI indicates confidence interval; GHQ-28, 28 item general health questionnaire; NZ, New Zealand.

The strengths of this study include a least biased and representative sample from a defined population with near complete follow-up, the inclusion of a broad range of physical, social and other measures, and the use of robust and validated measures to assess physical functioning (BI score) and psychiatric morbidity (GHQ-28). Finally, all potential exposures were ascertained before assessment of the outcomes of interest by interviewers who were unaware of the present research question.

However, we recognize that there are also limitations to the study. First, there was some selection bias in that patients without a GHQ-28 score at 1 month were more severely affected by the stroke. Although a similar proportion of those with (55%) and without (47%) GHQ-28 scores apparently returned to work by 6 months, this may be attributable to sample size limitations and may potentially be a bias. Another factor was that stroke severity was associated with both the a priori exposure (psychiatric morbidity) and poor outcome. Thus, any effect of selection bias through the loss of patients without GHQ-28 scores would likely have produced an underestimation of the true association between psychiatric morbidity and return to work. In such a large scale study, we were limited in the range of information pertaining to work, and no information was obtained in regard to important other factors such as the time taken to return, the proportion undertaking unpaid work, and the quality of work. While ethnicity was significant in the multivariable model, the small numbers of Maori, Pacific, Asian, and other minority groups prevented analyses of these specific groups and the conclusions that can be drawn. The study also failed to assess other relevant outcomes to patients, such as caring, and other roles in the family. Finally, as 24 patients with impaired cognition were excluded from completing the GHQ-28, we were unable to include cognition in our analyses, despite impaired cognition being identified elsewhere as an important determinant of return to work and other roles.[10] However, by excluding these participants we may have underestimated the significance of psychiatric morbidity on return to work.

The proportional frequency of return to work in our study is comparable to that obtained in a hospital register study from the United States, where 53% of patients were found to be working at 1 year after ischemic stroke.[19] Both studies reveal a much better prognosis than has been reflected from several rehabilitation outcome studies,[9,10] which among other factors, may be attributed to bias of preferentially including patients with more severe strokes. Of note was that only 35% of our "working" population received inpatient rehabilitation, which was a strong predictor of poor outcome: of those not working at 6 months, 54% (53/98) had been transferred to rehabilitation compared to 16% (18/112) of those working at 6 months. Of course, variation in the frequency of return to work after stroke is likely to be attributable to a number of other factors such as differences in definitions and timing of assessments. We were unable to confirm the relevance of several specific neurological deficits including dysphasia and lesion location, which have been identified in other studies as being important predictors of return to work.[12] It is noteworthy that 94% (105/112) of those people who returned to work were living at home by 1 month, giving a potential clinical indicator of recovery in relation to return to work. Most (86% [43/50]) of those who were still in hospital at 1 month were unable to return to work.

Successful return to work after stroke is strongly associated with a greater quality of life, as indicated by a qualitative study,[4] and is associated in cross sectional studies with many of the same predictive factors, including psychiatric morbidity, that were identified in our study.[27] Given the present emphasis on strategies to maintain healthy ageing and for workers to stay productive for as long as possible, it would seem important for interventions to be targeted at return to work after disabling illness such as stroke. However, stroke rehabilitation guidelines in both the United States and Australia,[2,28] among other countries, have identified vocational rehabilitation as an area with insufficient robust evidence of effectiveness. The limited data arguably reflects the emphasis being placed on other aspects of recovery and more direct "physical" targets for intervention.[29]

This study demonstrates that a potentially treatable factor, early psychiatric morbidity, is a predictor of an important patient-related outcome. Given the minimal treatment for psychiatric morbidity reported and the poorer outcome of this group, this suggests a need for greater attention to this aspect of stroke sequelae. Specifically, there is a need for robust evaluations of interventions aimed at the prevention, early detection, and effective management of psychiatric morbidity, with this important patient related outcome as a useful end point. As well as improving quality life, such strategies could assist in the earlier return to work and economic productivity for younger patients and families after stroke.

Acknowledgments

We are indebted to the research nurses for their dedication and performance, and to the ARCOS participants and their families and friends.

Sources of Funding

The study was funded by the Health Research Council of New Zealand. During the completion of this work Maree Hackett was in receipt of an Australian National Health and Medical Research Council Postdoctoral Research Fellowship.

Disclosures

None.

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